

Health Consultation

Carbide Lime Settling Pond
BOC Gases Acetylene Facility
7700 14th Avenue South
Seattle, Washington

March 10, 2000

Prepared by

**The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**



FOREWORD

The Washington State Department of Health (WDOH) has prepared this Health Consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This Health Consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this Health Consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. The Health Consultation allows WDOH to respond quickly to a request from concerned residents for health information on hazardous substances. It provides advice on specific public health issues. WDOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health.

For additional information or questions regarding WDOH, ATSDR or the contents of this Health Consultation, please call the Health Advisor who prepared this document:

Barbara Trejo
Washington State Department of Health
Office of Environmental Health Assessments
P.O. Box 47846
Olympia, WA 98504-7846
(360) 236-3373
FAX (360) 236-3383
1-877-485-7316

BACKGROUND AND STATEMENT OF ISSUES

The Washington State Department of Health (WDOH) has prepared this health consultation in response to a request from community members located in the South Park community of Seattle to evaluate whether contact with carbide lime from the BOC Gases Acetylene Facility is a threat to human health.

The BOC Gases Acetylene Facility (BOC Gases) is located at 7700 14th Avenue South in an industrial area near South Park, a small community in the southern part of Seattle, Washington (Figure 1). The property occupied by BOC Gases is bounded by East Marginal Way to the northeast, 16th Avenue South to the east, 14th Avenue South to the west, and an aerospace facility to the south.

BOC Gases, which has been operating at the property since 1908, produces acetylene gas by mixing calcium carbide with water. In addition to producing acetylene gas, the process also produces waste water and carbide lime as by-products. Some of the waste water and carbide lime generated during the production of the acetylene gas is discharged to a settling pond located in the northern portion of the property. The carbide lime is periodically removed from the settling pond and transported to the Georgia Pacific mill in Bellingham where it is used for acid neutralization.¹

The carbide lime generated at the BOC Gases facility consists of almost 100 percent calcium hydroxide. Trace amounts of calcium carbonate, silica, aluminum oxides, and magnesium oxides are also found in the carbide lime. The carbide lime generated during the acetylene production has a maximum pH of 12.5 at 25°C.¹

Site Visit

WDOH staff visited the BOC Gases facility on September 3, 1999, to observe site conditions.² A BOC Gases representative accompanied WDOH staff during the visit to provide information about the facility and to answer questions.

Calcium carbide arrives at the site in covered containers. The containers remain covered until brought to the acetylene process area where the contents are mixed with water. Four aboveground storage tanks at the sites are used to store the waste water and carbide lime generated during the acetylene production. When the tanks are full, the remaining waste water and carbide lime are discharged to the settling pond.²

The settling pond is located on a triangular piece of the BOC Gases property (Figure 2). East Marginal Way is located northeast of the settling pond; 14th Avenue South is located to the east; and the BOC Gases operation is located to the south of the settling pond. A berm of carbide lime surrounds the settling pond. The berm was approximately 6 to 8 feet high

during the site visit. At the request of the Washington State Department of Ecology, BOC Gases has covered the berm with plastic sheeting in the summer of 1999.

Bus stops are located approximately a block from the settling pond on 16th Avenue South and East Marginal Way. The East Marginal Way bus stop is located on the opposite side of the street from the BOC Gases facility.

The entire property is fenced. In addition, signs have been placed around the perimeter of the settling pond warning people who may climb the fence about the dangers associated with the pond.

The interior portion of the settling pond is uncovered. Carbide lime, a white substance when dry, has been placed to approximately the top of the berm in the western half of the pond; no water was noted in this portion of the pond. The eastern portion of the settling pond contains a carbide lime/water slurry as well as some wet carbide lime which is a grayish color. No carbide lime dust was observed during the site visit although there were moderate winds.

The BOC Gases representative reported that the company will be phasing out the settling pond in the near future. They are in the process of expanding their storage tank capacity and installing a recirculating system that will allow the carbide lime and waste water mixture to be reused rather than sent to the settling pond. The completion of the recirculating system and removal of the carbide lime from the settling pond area are expected to occur this year. However, no completion date has been set for these tasks.²

As part of the settling pond closure, BOC Gases will remove the carbide lime by rehydrating the lime into a slurry, and shipping it to the Georgia Pacific mill in Bellingham. Some carbide lime, however, cannot be rehydrated because of changes that occur to carbide lime as a result of drying. The BOC Gases representative indicated that the carbide lime that cannot be rehydrated will likely go LaFarge (formerly Holnam) Cement in Seattle for use in producing cement.²

Scattered fragments of carbide lime were noted outside of the fence located around the perimeter of the settling pond. However, no white carbide lime dust or sediment was noted on the ground or on vegetation or objects adjacent to the settling pond.

Sidewalks are located on the west side of the settling pond. People who may use this sidewalk are likely to be workers from the BOC Gases or the aerospace facility located along 14th Avenue South. Residents from the nearby South Park community are unlikely to use this sidewalk since it ends at the aerospace property. A dirt access road and railroad track are located northeast of the settling pond. People may walk along the northeast side of the settling pond. However, there are no sidewalks. No walkers were observed near the settling pond during the site visit.

Environmental Studies

Carbide lime samples were collected from approximately two to nine feet below the settling pond surface in July and August 1997 as part of an environmental assessment of carbide lime settling ponds conducted by BOC Gases. Samples were analyzed for metals, volatile organic compounds, semi-volatile organic compounds, and pH.

DISCUSSION

A. Introduction

The public health effects associated with exposure to a contaminant depend on two factors: the contaminants of concern and how people come into contact with the contaminants (i.e., exposure pathways). Contaminants of concern are those chemicals found at a property that may cause human health effects. However, not all chemicals found at a property are chemicals of concern and not all chemicals of concern are a health hazard.

In order for an exposure to a contaminant of concern to occur, all the elements of an exposure pathway must be in place. Exposure pathways are divided into completed and potential pathways and can be current, past, or future exposures. A completed exposure pathway consists of five elements: a contaminant source; environmental media that transport contaminants from the source (e.g., soil, groundwater, air); a point where people contact contaminated media (e.g., tap water); route of exposure by which a contaminant enters the human body (e.g., inhalation, ingestion, dermal contact or absorption); and a receptor population that is exposed to contaminants. A potential exposure pathway exists when some, but not all, of the five elements are present and the potential exists that the missing element(s) have been present, are present or will be present in the future.

Worker exposure to carbide lime at the BOC Gases facility was not evaluated as part of this health consultation. It is assumed, and required by law, that workers at BOC Gases who may encounter carbide lime at the facility are using appropriate health and safety measures.

Completed and potential exposure pathways associated with the carbide lime from the BOC Gases property are discussed below.

B. Carbide Lime

As noted above, the carbide lime generated at the site is predominantly calcium hydroxide with trace amounts of the calcium carbonate, silica, aluminum oxides, and magnesium oxides. Low levels of some volatile organic compounds (carbon disulfide, methyl ethyl ketone) semi-volatile organic compounds (benzoic acid, butylbenzyl phthalate, and bis(2-ethylhexyl) phthalate) and some metals (chromium and zinc) were detected in carbide lime samples analyzed during the 1997 environmental investigation conducted at the facility.¹ The

levels of organic compounds and metals detected in the samples, however, are below levels considered a health hazard. The carbide lime samples collected during the environmental investigation had a maximum pH of 12.3.¹

Carbide lime is a non-carcinogen. Exposure to carbide lime can occur through dermal contact, inhalation of fugitive dust, and ingestion.^{3,4}

Carbide lime contact with the eyes can cause irritation or alkaline burns. Since it can be difficult to remove by normal irrigation of the eyes it can do damage over long periods of exposure. Blindness can result. Skin contact with carbide lime can cause skin irritation and prolonged contact may cause dermatitis or burns. Ingestion of carbide lime may cause burns to the mouth and throat followed by severe abdominal pain. In severe cases, death can occur from ingestion of carbide lime. Inhalation of carbide lime dust may be severely irritating to the nose and throat. Repeated or prolonged inhalation exposure may inflame respiratory passages. Tightness of the chest and water accumulation in the lungs may occur following excessive inhalation of fugitive dust.^{3,4}

C. Completed Exposure Pathways

A completed exposure pathway exists for people who have direct contact with the carbide lime fragments located adjacent to the BOC Gases settling pond. However, very limited or no exposure is occurring since the BOC Gases facility is located in an industrial area with little foot traffic adjacent to the settling pond.

D. Potential Exposure Pathways

A potential exposure pathway exists for people who may be exposed to fugitive dust from the uncovered carbide lime settling pond. It is likely that very limited or no exposure would occur through the air pathway because the carbide lime surface is somewhat cemented, the carbide lime is not readily blown into the air especially during the wetter months of the year (November through June), and the facility is located in an industrial area with little foot traffic adjacent to the settling pond.

E. Child Health

The potential for exposure and subsequent adverse health effects are often increased for young children when compared with older children or adults. For example, children ingest more soil per body weight than do adults and therefore, receive higher exposures than adults. In addition to the potential for higher exposures of young children, the risk of adverse health effects is also increased. ATSDR and WDOH recognize that children are susceptible to developmental toxicity that can occur at levels much lower than those causing other types of toxicity.

The BOC Gases facility is located in an industrial area. Child exposure to the carbide lime is not anticipated. However, limited exposure may occur if a child encounters the carbide lime fragments along the fence or is exposed to fugitive dust.

CONCLUSIONS

1. No apparent public health hazard exists for the carbide lime stored at the BOC Gases facility because exposures are very limited or non-existent.

RECOMMENDATIONS

1. Carbide lime fragments located beyond the settling pond fence boundaries should be removed. The fence boundaries should be monitored at an appropriate frequency to ensure the carbide lime is contained within the facility.
2. The settling pond, including the berm cover recommended by the Washington State Department of Ecology, should be monitored and maintained to prevent the release of carbide lime from the property.
3. Removal activities at the settling pond could result in the release of carbide lime from the property. Removal activities at the settling pond should be conducted in a manner that will prevent such releases.

WDOH is available to review plans and reports generated as a result of the above recommendations.

REFERENCES

1. Subsurface Environmental Assessment, BOC Gases, 7700 14th Avenue South, Seattle, Washington, Delta Environmental Consultants, March 9, 1998.
2. Site Visit Summary, BOC Gases - Seattle, September 3, 1999, Barbara Trejo, WDOH.
3. Material Safety Data Sheet (MSDS), Lime Hydrate (Carbide Lime), BOC Gases, June 7, 1996.
4. Pocket Guide to Chemical Hazards, NIOSH Website, September 8, 1999.

Glossary

Agency for Toxic Substances and Disease Registry (ATSDR)	The principal federal public health agency involved with hazardous waste issues, responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is part of the U.S. Department of Health and Human Services.
Carcinogen	Any substance that can cause or contribute to the production of cancer.
Chronic	A long period of time. A chronic exposure is one which lasts for a year or longer.
Contaminant	Any chemical that exists in the environment or living organisms that is not normally found there.
Exposure	Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short term (acute) or long term (chronic).
Groundwater	Water found underground that fills pores between materials such as sand, soil, or gravel. In aquifers, groundwater often occurs in quantities where it can be used for drinking water, irrigation, and other purposes.
Hazardous substance	Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
Ingestion rate	The amount of an environmental medium which could be ingested typically on a daily basis. Units for IR are usually liter/day for water, and mg/day for soil.
Media	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.
Risk	The probability that something will cause injury, linked with the potential severity of that injury. Risk is usually indicated by how many extra cancers may appear in a group of people who are exposed to a particular substance at a given concentration, in a particular pathway, and for a specified period of time. For example, a 1%, or 1 in 100 risk indicates that for 100 people who may be exposed, 1 person may experience cancer as a result of the exposure.
Route of exposure	The way in which a person may contact a chemical substance that includes ingestion, skin contact and breathing.

